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FOR

MULTIMODE PERSONAL COMMUNICATION SYSTEM AND METHOD

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1 MULTIMODE PERSONAL COMMUNICATION SYSTEM AND METHOD

2 Background of the Invention3 (1) Field of the Invention

4 The present invention relates generally to the field of personal
5 telecommunications, and in particular to a location independent personal
6 telecommunications system that utilizes a multimode system that accesses wireless voice,
7 data, and cellular transmission means in order to enable the user to place a call from any
8 service location via a personal communication device through any of the modes and to
9 receive calls through any of the modes regardless of the location of the user.

10 (2) Description of the Prior Art

11 The importance and size of the computer and telecommunications industries has
12 generated numerous communication modes, such as conventional telephone mode,
13 wireless telephone mode, computer network, and wireless computer network. Each of
14 these communication modes offers a desirable feature, such as reduced costs, mobility,
15 etc. Subscription by a user to more than one of these modes often results in the need to
16 carry numerous devices in order to receive service via each mode, resulting in an
17 inconvenience, such as excessive weight or volume to be carried and multiple steps to
18 switch between devices. Prior art embodiments have attempted to integrate these modes
19 into a single device.

20 More particularly, relevant prior art indicates that it is known to provide a portable
21 communication device such as a laptop computer, palmtop or handheld computer,
22 personal digital assistant (PDA), cellular telephone, or cordless telephone. Additionally,
23 it is known to use a method for establishing a wireless link for communication from such

1 a device. Finally, server-based wireless communication between a PC and PDA is
2 known, as is telephonic communication via computer network, user and/or caller
3 identification. Specific citations and brief abstract statements summarizing the main
4 points for each prior art reference are as follows:

5 US Patent No. 6,216,013 issued 04/10/01 to Moore, et al. & assigned to Cable &
6 Wireless PLC for *Communication system with handset for distributed processing* teaches
7 a communication system, comprising at least one mobile handheld telephone handset
8 adapted to communicate with a telephone network handling system. The handset is
9 capable of voice transmission, speech recognition, and data transmission.

10 US Patent No. 6,198,941 issued 03/06/01 to Aho, et al. & assigned to Lucent
11 Technologies, Inc. for *Method of operating a portable communication device* teaches a
12 method of effectuating a change in the operation of a portable communication device
13 such as a laptop, palmtop, PDA, or cellular telephone. Various signals indicative of the
14 operating environment are monitored, to anticipate or predict a change or transition from
15 one communication arrangement to the other. If the change is determined to be both
16 imminent and significant, the operation change occurs spontaneously to avoid loss of
17 performance of the device.

18 US Patent No. 6,195,564 issued 02/27/01 to Rydbeck, et al. & assigned to
19 Ericsson Inc. for *Method for automatically establishing a wireless link between a wireless*
20 *modem and a communication device* teaches a system and method for automatically
21 establishing or activating a wireless link between a communication device and a wireless
22 modem so that electronic messages can be easily and automatically transferred between

1 the communication device and a data network. The communication device can be a
2 portable computer and the wireless modem can reside in a wireless phone, cellular phone,
3 PCS phone, etc. This invention is especially useful in the situation where the
4 communication device and the wireless modem move in and out of range of the wireless
5 link or each other.

6 US Patent No. 6,072,598 issued 06/06/2000 to Tso for *Method for*
7 *enhancing usability of fax on small device* teaches a method and system for
8 viewing faxes on a PDA or handheld computer. In a device with limited
9 processor/memory capability such as a PDA, this is a method and system for
10 viewing a facsimile transmission image, by routing the transmission to a computer
11 system for processing before it reaches the device. Processing includes
12 recognizing text and filtering it from the transmission, and outputting it to a
13 transmittal data file to be sent to the device.

14 US Patent No. 6,034,621 issued 03/07/01 to Kaufman & assigned to Lucent
15 Technologies, Inc. for *Wireless remote synchronization of data between PC and PDA*
16 teaches a system wherein wireless paths between PC and PDA are utilized to synchronize
17 data files between them. A simple and efficient wireless way to synchronize data files on
18 separated computers that do not require a fixed, direct connection to each other; data files
19 can be updated on a frequent, inconspicuous and convenient basis.

20 US Patent No. 5,983,073 issued 11/09/99 to Ditzik for *Modular notebook and*
21 *PDA computer systems for personal computing and wireless communications* teaches a
22 small lightweight modular microcomputer based computer and communications systems,

1 designed for portable and desktop use. The systems are capable of bi-directional real-time
2 communications of voice, audio, text, graphics, and video data. Wireless and wire-based
3 communications methods & devices are implemented.

4 US Patent No. 6,219,560 issued 04/17/01 to Eikkila, et al. & assigned to Nokia
5 Mobile Phones Ltd for *Modular mobile communication system* teaches a mobile
6 communications device constructed to receive an expansion card which allows the user to
7 add a new function in the host device, including external equipment such as the optical
8 unit of a digital camera, which facilitates visual communication in addition to audio/text
9 communication.

10 US Patent No. 6,192,258 issued 02/20/01 to Kamada, et al. & assigned to Access
11 Co. Ltd; Sony Corp. for *Mobile communication device with a rotary push switch* teaches
12 a mobile communication device with a flat display capable of displaying an HTML
13 document. A personal information list written in HTML is present on the display. Anchor
14 points are set to person names, phone numbers, FAX numbers, and email addresses in the
15 list. Selection of these items with a pen causes their associated operations to be
16 performed.

17 US Patent No. 6,188,917 issued 02/13/01 to Laureanti & assigned to Nokia Mobile
18 Phones Ltd. for *Portable telecommunications assembly having user hand-hold, and*
19 *associated method* teaches a communication device combined with a portable radio
20 telephone that operates upon communication media and transceives signals representative
21 of the communication media between the device and a remote station. The
22 communication device includes a docking port into which the portable radiotelephone is

1 insertable, and used as a handhold to support the communication device engaged together
2 with the phone. Permits user of a wireless communication device (PDA) to hold the PDA
3 engaged with a portable radiotelephone.

4 US Patent No. 5,528,248 issued 06/18/96 to Steiner, et al. & assigned Trimble
5 Navigation, Ltd. for *Personal digital location assistant including a memory cartridge, a*
6 *GPS smart antenna and a personal computing device* teaches a handheld apparatus
7 (PDA) having a GPS antenna and receiver to provide location information, capable of
8 using standard operating systems to run existing applications, and capable of running
9 programs to provide a mobile professional, personal traveler, or navigator with a display
10 of location and relative locations and attributes of map features proximate to him.

11 US Patent No. 6,209,011 issued 03/27/01 to Vong, et al. & assigned to Microsoft
12 Corp. for *Handheld computing device with external notification system* teaches a portable
13 handheld computing device has a notification system that alerts a user of an event
14 regardless of whether the device is on or off.

15 US Patent No. 5,930,700 issued 07/27/99 to Pepper, et al. & assigned to Bell
16 Communications Research, Inc. for *System and method for automatically screening and*
17 *directing incoming calls* teaches a system that automatically screens and forwards
18 incoming calls to another number or voicemail if necessary according to caller
19 identification information and schedule information in a database; This database is
20 managed in conjunction with the address book and calendar on a PDA. This system does
21 not include any phone functionality on the PDA itself.

1 US Patent No. 5,522,089 issued 05/28/96 to Kikinis, et al. & assigned to Cordata,
2 Inc. for *Personal digital assistant module adapted for initiating telephone*
3 *communications through DTMF dialing* teaches a system that, among other functions,
4 generates DTMF tones in a PDA using special strings of text output to the speaker.

5 US Patent No. 5,940,479 issued 08/17/99 to Guy, et al. & assigned to Northern
6 Telecom Limited for *System and method for transmitting aural information between a*
7 *computer and telephone equipment* teaches a system that provides a gateway between PC-
8 based phones on a computer network and a conventional phone system; This system does
9 not include intelligent switching capabilities between multiple phone networks or any
10 provision for communicating directly with wireless devices.

11 US Patent No. 5,889,845 issued 03/30/99 to Staples, et al. & assigned to Data
12 Race, Inc. for *System and method for providing a remote user with a virtual presence to*
13 *an office* teaches a server set up at an office can be contacted by a remote user via his
14 home phone line; the server will treat a remote user as if (s)he were at the office,
15 automatically routing all calls, e-mails, and faxes to the remote user.

16 US Patent No. 6,185,291 issued 02/06/01 to Miloslavsky & assigned to Genesys
17 Telecommunication Laboratories, Inc. for *Personal desktop router* teaches a software
18 package designed to route calls on a local telephone system based on caller ID
19 information on the incoming calls. Individual copies of the software on all users'
20 computers communicate with a server to determine how calls are routed for that user.
21 Users can modify rules for the routing of their calls.

1 US Patent No. 6,169,791 issued 01/02/01 to Pokress & assigned to Mediacom
2 Corp. for *System and method for least cost call routing* and US Patent No. 5,799,072
3 issued 08/25/98 to Vulcan, et al. & assigned to CallManage for *Telecommunications Call*
4 *Management System* teach similar inventions: A system that stores information about
5 rates of commercial, landline long distance carriers; users download this information and
6 software enables them to select the lowest-cost route for any given call based on location
7 and pricing structure. Note that this invention has no provisions for wireless operation.

8 US Patent No. 5, 878,334 issued 03/02/99 to Zicker & assigned to GTE Wireless
9 Service Corp. for *Module for selectively providing wireless call communications*
10 *services*; US Patent No. 5,887,259 issued 11/21/00 to Zicker & assigned to GTE Wireless
11 Service Corp. for *Multiple mode personal wireless communications system*; and US
12 Patent No. 6,151,510 issued 11/21/00 to Zicker & assigned to GTE Wireless Service
13 Corp. for *Module for providing wireless call communication services through wire-*
14 *connected telephone equipment*. These three patents teach a similar systems: A system
15 that automatically switches calls between a cellular system and cordless landline system
16 depending on the location of the caller; this system does not compute the lowest-cost
17 option for placing a call.

18 US Patent No. 5,315,636 issued 05/24/94 to Patel & assigned to Network Access
19 Corp. for *Personal Telecommunications System* teaches a system that allows a user to
20 have one telephone number for both an office and wireless phone; incoming calls are
21 routed to the user based on the last known location of the user. This system will route
22 calls to third party phone numbers if that number is the last known location of the user.

1 Thus, although the prior art can integrate different modes of communication, it
2 inadequately integrates multiple modes and advanced features into a single device and
3 system. For instance, prior art integrates wireless telephone service with cordless landline
4 telephone service providing a device that can automatically switch between wireless and
5 landline protocols depending on the proximity of the user to his landline telephone
6 connection. Such devices do not integrate with newer voice-over-IP (Internet Protocol)
7 technology nor do they allow incoming calls to be routed to other landline telephone
8 numbers than the user's own personal landline connection. Additionally, although some
9 prior art teaches the use of Session Initiation Protocol (SIP) and the H323 Protocol that
10 can route data through a gateway to a Public Switched Telephone Network, or PSTN, the
11 prior art does not teach the routing of data to a portable communication device. Thus, the
12 prior art systems provide only partial integration of the available communication modes
13 and do not provide full integration with advance modes and features.

14 Thus, there remains a need for a multimode personal communication system for
15 transmitting and receiving calls or voice communication with local and remote persons
16 via conventional telephone mode, wireless telephone mode, computer network, cordless
17 telephone, and/or wireless computer network based upon the personal communication
18 device user's proximity to a multiplexing, multimode communication device and the
19 predetermined provider for the particular voice communication.

20 Summary of the Invention

21 The present invention is directed to a multimode personal communication system
22 for transmitting and receiving calls or voice communication with remote persons via

1 conventional telephone mode, wireless telephone mode, wireless data mode and/or
2 dataline data mode, based upon the personal communication device user's proximity to a
3 multiplexing, multimode communication device and the predetermined provider for the
4 particular voice communication.

5 In a preferred embodiment, at least one personal communication device, or PCD,
6 is in wireless communication with at least one multiplexing communication device, or
7 MCD, for the transmission and reception of calls or voice communication with remote
8 persons via landline telephone, wireless computer network, or wired computer network.

9 When not in the presence of an MCD, a PCD is in communication with a wireless
10 telephone system, wireless or wired computer network, or cordless telephone system.

11 The present invention is further directed to a method for using the system.

12 These and other aspects of the present invention will become apparent to those skilled in
13 the art after a reading of the following description of a preferred embodiment when
14 considered with the drawings.

15 Brief Description of the Drawings

16 Figure 1 is a block diagram of a system/network constructed according to the present
17 invention.

19 Definitions

20 Throughout this document, specific terms shall be defined as follows:

21 "External" shall refer to something that exists outside the present invention such
22 as the Internet or a PSTN (Public Switched Telephone Network). For example, the
23 "external telephone system" shall refer to the telephone network interconnected

1 throughout the world that allows users to contact one another using a numerical code,
2 which represents a particular landline telephone system or wireless telephone as defined
3 below. "External Modes" shall refer to all those modes of communication outside the
4 present invention, such as the "external telephone system", the Internet, and other modes
5 of communication.

6 A "landline telephone" system shall refer to a conventional wired telephone
7 system including commercial Private Branch Exchange (PBX) systems and residential
8 and commercial wired phone lines.

9 A "cordless telephone" shall refer to a specific type of "landline telephone" as
10 defined above wherein a connection between a handset or headset and a base unit is a
11 wireless connection. Only a small number of handsets communicate with a small number
12 of base units. "Cordless telephone" systems as opposed to "wireless telephone" systems
13 defined below shall be those that are designed to operate over a short distance, for
14 instance, within the confines of one home or business location, and are not designed to
15 automatically switch between base units when the user moves from place to place. In a
16 multi-line "cordless telephone" system, each base unit is assigned a unique telephone
17 number depending on how it is connected to the external telephone system.

18 A "wireless telephone" shall refer to a telephone designed to communicate with
19 multiple base units depending on the location of the user and shall include those systems
20 traditionally referred to as "mobile telephones", "cellular telephones", and "digital cellular
21 telephones". Like "cordless telephones", "wireless telephones" shall refer to systems
22 where the connection between a handset and a base unit is wireless. "Wireless
23 telephones" as opposed to "cordless telephones" shall refer to those telephone systems

1 wherein each handset or small group of handsets is assigned a unique number and is
2 designed to communicate with the nearest compatible base unit to the location of the user.
3 Newer technologies not specifically mentioned here that fit this description of a "wireless
4 telephone" shall be referred to by the term "wireless telephone" in this document. The
5 adaptation of newer wireless technologies to the present invention will be obvious to one
6 skilled in the art.

7 An "analog cellular telephone" shall refer to a specific type of "wireless
8 telephone" wherein the wireless connection between a handset and a base unit is an
9 analog radio frequency connection.

10 A "digital cellular telephone" shall refer to a specific type of "wireless telephone"
11 wherein the wireless connection between a handset and a base unit is a digital radio
12 frequency connection. "Digital cellular telephone" shall refer to any of several existing
13 digital communications protocols as well as other protocols that may be developed in the
14 future. Newer technologies that fit this description of "digital cellular telephone" shall be
15 referred to by the term "digital cellular telephone" in this document. The adaptation of
16 newer digital communications methods to the present invention will be obvious to one
17 skilled in the art.

18 A "computer network" shall refer to any group of interconnected computers
19 including a local area network, or LAN, wide area network, or WAN, and the internet. A
20 "computer network" shall refer to computers connected via any means, including DSL,
21 cable modem, T1, T3, V.90, X2, 10baseT, 100baseT, and other protocols and methods.

22 A "wireless computer network" shall refer to a specific type of "computer
23 network" wherein the connections between the computers in the network are wireless. A

1 “wireless computer network” shall refer to networks connected on any radio frequency or
2 optical communications band and networks connected via any protocol including, IEEE
3 802.11b, also known as Wi-Fi™, Bluetooth, and other protocols.

4 A “transceiver” shall refer to a combination of a transmitter and receiver capable
5 of communicating with another transceiver also including a combination of a transmitter
6 and a receiver to provide bi-directional communication between two communications
7 devices.

8 A “softPBX” server shall refer to a server with PBX functionality performed by
9 software running on the server.

10 Detailed Description of a preferred Embodiment

11 In the following description, like reference characters designate like or
12 corresponding parts throughout the several views. Also in the following description, it is
13 to be understood that such terms as "forward," "rearward," "front," "back," "right," "left,"
14 "upwardly," "downwardly," and the like are words of convenience and are not to be
15 construed as limiting terms.

16 Referring now to the drawings in general, the illustrations are for the purpose of
17 describing a preferred embodiment of the invention and are not intended to limit the
18 invention thereto. Referring now to FIG. 1, there is shown a block diagram for the
19 multimode personal communication system, generally referenced as 10, that includes at
20 least one personal communication device 12, or PCD, communicating with at least one
21 multiplexing communication device 14, or MCD. The PCD and MCD can communicate
22 with one another via a wireless computer network 16, or other means 18, including a
23 wired computer network, direct telephone cable, or wireless connection using cordless

1 telephone protocol. The PCD can also communicate with other wireless voice
2 transmitter/receivers 20. The MCD can offer communication via landline telephone line
3 22 and computer network 24. Thus, the MCD system can transmit and receive voice
4 communication with external communication systems 26 via landline telephone and via
5 computer network using one of several methods and protocols for such communication.
6 The PCD can access the modes connected to an MCD or a PCD can function alone as a
7 landline telephone, cordless telephone, wireless telephone, a node on a computer
8 network, or a node on a wireless computer network depending on the embodiment of the
9 invention and the connections available to the PCD.

10 The PCD includes a speaker, a microphone, at least one transmitter/receiver for
11 transmitting and receiving information, a battery for power, a data entry system for
12 entering information, a microprocessor, and a memory as required for operation of the
13 microprocessor. In a preferred embodiment, the transmitter/receiver is a radio frequency
14 antenna, the battery is a rechargeable, extended-life battery, and the data entry device is a
15 touchpad. Alternatively or additionally, the transmitter/receiver may be an optical
16 transmitter/receiver. Such an optical transmitter/receiver can use infrared frequencies for
17 the transmission of information. Alternately or additionally, the transmitter/receiver can
18 be a wired computer network device. Additionally, the PCD includes the features of a
19 personal digital assistant, or PDA, to store, process, and display various types of
20 information that may be of use to the user. To this end, the PCD includes additional
21 memory for the storage of information. In a preferred embodiment of the present
22 invention, the PCD includes at least eight Megabytes of memory, which may be
23 expandable as necessary to accommodate additional functions and/or processing.

1 Because the PCD is portable and can be used to transmit personal information, the
2 PCD may include at least one security system, including user identification means or
3 UIM for identifying a pre-approved user of the device. The at least one UIM may include
4 user identification and passcode, key code devices, and/or biometric identification means
5 for identifying a pre-approved user of the PCD. The biometric user identification means
6 may be voice-based, fingerprint-based, and the like, and combinations thereof. In
7 addition to preventing the loss of personal information and/or unauthorized access or use
8 of the PCD, the user identification means allows multiple users to use the device and
9 preserve the security of the other users' information. Because a user may have more than
10 one user ID on the PCD, each associated with a specific occupation, hobby, location,
11 priority level, or the like, the user will need to be able to determine to which user ID an
12 incoming call has been placed. Therefore, for any given incoming call, the PCD displays
13 the specific user ID of the called user, herein referred to as the "Called ID". The PCD
14 does not necessarily communicate the Called ID via the display, but can use other
15 systems, such as different tones for different user IDs. Alternately or additionally, because
16 the PCD can receive calls placed to various numbers or computer addresses, the PCD
17 displays the specific telephone number or computer address called by a calling party.

18 In a preferred embodiment, the PCD also functions as a telephone, providing
19 voice telecommunication service to the user. The PCD can use a variety of
20 communication means without the aid of an MCD, including landline telephone, wireless
21 telephone, both wireless and wired computer network, and the like. Thus, the PCD can
22 function as a landline telephone, a wireless telephone, a cordless telephone, or a voice-

1 over-IP transceiver when connected to a computer network, wireless or otherwise, and the
2 like.

3 In a preferred embodiment, the communication transmitted over the multimode
4 communication system is encrypted to prevent unauthorized access to the information. In
5 a preferred embodiment, the encryption is performed asymmetrically via a method such
6 as the Public/Private Key Encryption method. In this method, public keys are exchanged
7 between users. These public keys are stored in the PCD, preferably cached in the address
8 book and associated with the proper contact number. Thus, a preferred embodiment
9 according to the present invention includes asymmetric encryption of voice
10 communication. Furthermore, the encryption is running on the multimode
11 communication system as the default setting. This is in contrast to other systems, such as
12 the IEEE 802.11b protocol, wherein the encryption is symmetric encryption only and
13 needs to be activated prior to use.

14 The PCD includes a PDA to store, process, and display various information. One
15 of the functions of the PDA includes an address book to retain and display the names,
16 street and electronic addresses, and telephone numbers of the user's contacts. The address
17 book interfaces with the telephone functions of the PCD, such that a contact number can
18 be selected in the address book for auto/speed dial. Information can be inputted into the
19 PDA by a variety of means; for example, data can be inputted by typing, touch pen,
20 speaking or voice-recognition, and electronic file transfer.

21 The PDA may also include a personal information manager, or PIM. The PIM is capable
22 of maintaining and transmitting the user's personal information. For example, the PIM
23 can transmit and receive users' public keys for encryption, credit card numbers and

1 authorization codes to vendors for transactional purposes. Also, the PIM is capable of
2 transmitting digital signatures, such as digital certificates, to authenticate the caller. The
3 transmission of digital signatures and other types of identification information can be
4 performed automatically at the initiation of the call, or manually during the
5 communication.

6 The multiplexing communication device or MCD includes a telephone network
7 handling system. In a preferred embodiment, the MCD functions as a multiplexing,
8 Private Branch Exchange, or PBX, server capable of routing communication via
9 telephone or data communication modes. The routing is performed by software running
10 on the server. Thus, the MCD is a softPBX server. The communication modes include
11 landline telephone lines, wireless telephone, computer network lines, DSL lines, cable
12 lines, T1 lines, and the like.

13 In a preferred embodiment, the multiplexing communication device includes a
14 multiplexing server. Preferably, the multiplexing server includes the functionality of a
15 PBX server using the 2.4 Gigahertz frequency band for communication the IEEE
16 802.11b, Bluetooth, or other protocol to communicate with personal communication
17 devices. Additionally, the MCD can transmit 7-22 Megabits/sec and can support up to
18 1024 PCDs. Thus, the MCD is capable of providing a wireless communications Internet
19 protocol or IP hub. The wireless IP hub can use a protocol such IEEE 802.11b,
20 Bluetooth, and the like. Thus, the MCD is capable of providing both voice telephone
21 access and access to a computer network through the use of a single wireless IP
22 connection with a personal communication device. More specifically, the MCD may
23 provide voice over IP telephony using the IEEE 802.11b protocol. Thus, in a preferred

1 embodiment, the PCD is a Wi-Fi™ telephone. In another embodiment, an MCD can
2 communicate with a PCD using cordless telephone protocols to provide access to voice
3 telephone lines. Thus, the MCD is capable of transmitting voice telephony over a
4 multiplicity of connections.

5 In a preferred embodiment, multiplexing communication devices are located in office,
6 home, and foreign sites. Foreign sites are those where the user is not primarily based,
7 such as at the offices of organizations different from the user's organization. An MCD
8 detects PCD's in its proximity, determines the users of each PCD and the primary MCD
9 for that user, and transmits the users' locations back to each user's primary MCD so that a
10 call can be forwarded to the user. In a preferred embodiment, detection is automatic, but
11 may include a manual override, e.g., when the PCD user is at home and does not prefer to
12 have work-related calls to be automatically forwarded to the home MCD after business
13 hours. Alternatively, the forwarding may be automatically selective based on the user's
14 location, time of day, or date. For example, if the PCD user is at home during business
15 hours, a call to the user's office number will be automatically forwarded to the home
16 MCD. After a predetermined hour, such as after the end of normal working hours, the
17 office MCD no longer automatically forwards calls to the home MCD. Such a system can
18 be especially convenient to users who periodically work at home. Thus, a preferred
19 embodiment according to the present invention provides selective, predetermined,
20 automatic call forwarding for multiple numbers for called ID(s), including proximity-
21 based, selective, predetermined, automatic call forwarding. Additionally, when a user
22 leaves the range of an MCD or other communications mode, the PCD can be
23 automatically switched to another MCD or another mode. For example, a user that is

1 leaving the range of an MCD can be switched to a cellular protocol, as taught in US
2 Patent 6,198,941 issued to Aho, et al. and incorporated herein by reference in its entirety.

3 The multimode personal communication system includes operating software that
4 confers a multiplicity of functions to enhance the ease of use of the PCD. In a preferred
5 embodiment, the MCD selects the mode to route the call based on user preferences. The
6 user preferences may be predetermined or determined at the time of placing the call. For
7 example, the MCD can be programmed to select the mode to route the call through based
8 on the cost of service. Alternatively, the MCD can select the mode to route the call based
9 on the performance of the modes. For example, if one of the modes is functioning at less
10 than optimal performance, the MCD can route the call through another mode. In a
11 preferred embodiment, the MCD selects the mode to route the call based on the range of
12 the call, wherein the range is either a toll-free call, including local communication, or a
13 toll call, such as a long-distance call. The MCD may also select the mode to route the
14 call through based on the identity of the user. For example, a local user, one whose
15 primary MCD is the accessed MCD, may be provided access to all the communication
16 modes, whereas a foreign user, one whose primary base is different from the local base
17 being accessed and is thus accessing a foreign MCD, may have access only to local
18 communication and the foreign user's subscriber account on an internet based, voice-
19 over-IP telephone gateway service.

20 The MCD may provide a variety of accessory functions for the user's or system
21 manager's benefit. In a preferred embodiment of the present invention, the MCD is a
22 softPBX server that is capable of providing a log of call times, call lengths, and call
23 modes. The softPBX server also identifies the called party by telephone number and

1 name. The softPBX server also provide communication features selected from the group
2 consisting of caller ID, voice mail, call forwarding, call hold, hold music, directory
3 assistance, paging, peer-to-peer communication, call transfer, and the like. Peer-to-peer
4 communication allows direct transfer between users; the direct transfer may be made
5 using a number, e.g. an extension, or using a name of the other individual. The MCD can
6 allow direct call transfer to peers and to foreign users via the PDA. A foreign user is one
7 whose primary base is not the receiver's current location. Thus, a user may receive a call
8 from a foreign caller and transfer the caller to a third user at a second foreign site.
9 Additionally, the user may perform this function while away from his/her primary base
10 and communicating with a foreign server. This call transfer action can be performed by
11 selecting a third user's number and/or mode from the third user's communication file and
12 instructing the MCD to transfer the incoming call to the third user. Additionally,
13 communication directory files are downloadable to the PDA via the MCD for use in
14 information retrieval and speed dialing.

15 In a preferred embodiment, the MCD includes at least two main functions, a
16 switching function that routes communication between the various modes and
17 connections to it, and a routing function that determines how calls are routed. The
18 components that perform these two functions need not be located in the same place, but
19 they could be. For instance, switching function components could be in a housing
20 connected to a computer network and routing function components could be software on
21 a computer connected to the same network. The switching function components would
22 communicate with the routing function components over the computer network. In

1 another embodiment, the MCD would include both the switching function components
2 and the routing function components in the same housing.

3 In another embodiment, the call routing server exists on a computer on a local
4 area network (LAN). Connections to PCDs are established using a wireless IP hub using a
5 protocol such as IEEE 802.11b or Bluetooth. A connection to a wide area computer
6 network such as the internet is supplied directly to the LAN using DSL, T1, T3, X2, V.90,
7 or another internet connection protocol or method. Multiple wireless IP hubs using the
8 IEEE 802.11b protocol could be added to the network to provide connections to a large
9 number of PCDs, thereby providing one means of scalability for the system.

10 The invention is further directed to a method for multimode personal
11 communication, including the steps of:

12 Providing a multiplexing communication device capable of communicating with other
13 communication systems via various communication modes including landline
14 telephone, computer network, cordless telephone, and wireless computer network for
15 routing incoming calls to system users and for routing outgoing calls from system
16 users

17 Providing a PCD that communicates with the multiplexing server via wireless
18 computer network, wired computer network, landline telephone, and cordless
19 telephone wherein for routing outgoing calls from system users:

20 Receiving a call initiation request from PCD;

21 Determining the mode to transmit the call,

22 Transmitting the communication received and initiated by the system over the
23 selected mode using the system set forth in the foregoing;

1 and wherein for routing incoming calls to system users:

2 Receiving a call from an external communication system:

3 Determining the best route from the MCD to the PCD,

4 Routing the communication received and initiated by the system over the selected
5 mode using the system set forth in the foregoing.

6
7 Certain modifications and improvements will occur to those skilled in the art upon
8 a reading of the foregoing description. By way of example, using the PDA to forward
9 calls to another number during scheduled meetings. Also, when not located in close
10 proximity to a user's primary MCD, a user may access a generic wireless computer
11 network using a wireless protocol such as IEEE 802.11b or Bluetooth to connect to a
12 user's primary MCD when a foreign MCD is also not in close proximity. All
13 modifications and improvements have been deleted herein for the sake of conciseness and
14 readability but are properly within the scope of the following claims.
15